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THE AMERICAN
JOURNAL OF PHARMACY

JANUARY, 1916

HYOSCYAMUS CULTIVATED IN MINNESOTA: MOISTURE, ASH AND ALKALOIDAL CONTENT.*

By E. L. Newcomb and M. H. Haynes.

During the past few years various species of Hyoscyamus have been cultivated in the Medicinal Plant Garden, College of Pharmacy, University of Minnesota, chiefly for the purpose of increasing the educational facilities of the college. Methods of culture and the growth of the plants have been studied, samples of the drug Hyoscyamus have been prepared from the different varieties, and these samples have been examined with reference to ash and total alkaloidal content.

The plants yielding the samples reported upon in this paper were propagated by sowing the seed in seed-pans in the plant-house, transplanting the seedlings to flats, then small pots, and later, when danger of frost was over, to plots in the open garden. The plants of the annual varieties were placed about fifteen inches apart in the plots, while those of the biennial variety were planted about twenty inches apart each way. The soil of the garden plots in each case was composed of a light sandy loam mixed with considerable humus.

Germination and cultural data have been given in an earlier paper by one of us, but the following additional data may be of value to those who are interested in the culture of Hyoscyamus. It has been found that a satisfactory germination of the seed of *Hyoscyamus niger* biennial may be obtained by treating the seed with concentrated sulphuric acid. The method which has thus far given the best results has been that of placing the seed in a porcelain dish, adding concentrated sulphuric acid, and stirring with a glass rod for two and

* Read before the American Chemical Society, Division of Pharmaceutical Chemistry, Seattle, Wash., September, 1915.

305704

a half minutes, after which the seed are immediately thrown onto a coarse screen and thoroughly washed with water. We have found biennial henbane seed treated in this manner to give a fairly uniform germination within twelve to fifteen days. Untreated seed of the biennial henbane, in our experience, requires a very variable length of time to germinate.

The growing plants of both the annual and biennial varieties of Hyoscyamus are very susceptible to attack by the Colorado potato beetle (*Dorophora decemlineata*). We have been able to readily control this enemy by the application, early in the season, of Paris green or other arsenical poison, either as a spray or dusted dry upon the plants.

Further experiments to determine the constancy of *Hyoscyamus niger* biennial have led this summer (1915) to the discovery of two specimens of known biennial origin which are completing their cycle of growth in one season. These two plants are among about five hundred of the biennial type under culture, and were not to be distinguished from the other plants during the first three months of their growth. The latter part of August these two specimens developed heavy branching stalks bearing yellow flowers with purplish veins, and being in every way characteristic of the second year's growth of the biennial henbane. We are unable to explain why these two specimens have developed as annual plants, but offer, as a possible explanation, the unusual low temperature of the growing season, the early germination of the seed (February), and the abundance of plant food. The discovery of the two specimens indicates that there are at least races of the biennial *Hyoscyamus niger* which possess the semi-latent capacity of growing as annuals.

Samples for moisture, ash and alkaloidal determinations were collected from the annual varieties, June 28, and from the first year's growth of the biennial form on July 20. The samples of the annual varieties consisted of the flowering tops, about 10 cm. in length, with a maximum stem diameter of not over 5 mm., each bearing from two to four flowers and a few immature fruits. Two samples from the biennial plants represented, first, basal leaves without the large fleshy petioles, and, second, the petioles alone. All samples were carefully cleaned from adhering sand, weighed, and dried at a temperature of from 60° to 80° C.

The following table gives the results of the moisture, ash and alkaloidal determinations:

Description of sample	Per cent. H_2O lost on drying	Per cent. total ash	Per cent. total alkaloid, U. S. P. IX method
Hyoscyamus niger biennial, lamina only, first year	87.4	14.07 14.2 14.5 14.8	0.0896 0.0896
Hyoscyamus niger biennial, petioles only, first year	91.6	18.9 18.8	0.0896 0.1012
Hyoscyamus niger annual, flowering tops	85.06	11.66 11.41	0.1561 0.1301
Hyoscyamus pallidus, flowering tops	84.8	12.33 11.09	0.1301 0.1243

Department of Pharmacognosy, College of Pharmacy,
University of Minnesota.

A COMPARISON OF THE RESULTS SECURED BY THE USE OF THE GUINEA-PIG AND CAT METHODS FOR THE ASSAY OF TINCTURE OF ACONITE.

By Charles C. Haskell and H. B. Thomas.

A considerable amount of evidence has been adduced, tending to show that the chemical method of assay for aconite is unreliable.[1, 2, 3, 4, 5] Such being the case, if the drug is to be used in the treatment of disease, the effort should be made to decide upon a satisfactory method of physiological assay and insist upon its employment until a reliable chemical method can be discovered.

Roth's investigations [6] seemed to prove that the guinea-pig method was quite satisfactory, but several possible sources of error were not considered in his paper. First, is the resistance of guinea-pigs to poisoning by aconite constant and not subject to seasonal variation? This is a point that should be determined, because it has been shown that season plays an important rôle in regard to the resistance of guinea-pigs to poisoning by other substances. It is also possible that certain samples of tincture of aconite may contain substances which delay or prevent the absorption of the aconitine when the sample is injected subcutaneously. It is well known that fluidextract of *Cannabis indica* has no apparent systemic action when injected subcu-

taneously, and the same may be true, to a certain extent, with regard to tinctures of aconite made from certain lots of drug or according to some modified technic.

With these facts in mind, Ford and Wine [7] compared the results secured by the use of the guinea-pig and the cat methods for the assay of tincture of aconite. From their work, it seemed that the two methods gave concordant results when applied to some samples, but discordant when other samples were tested by both methods. In carrying out the tests on guinea-pigs, they subjected their tinctures to a moderate amount of heat, and this may have had the effect of bringing about some decomposition. It seemed desirable, therefore, to investigate the methods still further, and endeavor to ascertain whether certain definite sources of error existed in either.

Nine samples of tincture of aconite were procured. Eight of these were tested upon guinea-pigs and eight were tested upon cats, seven, therefore, being tested by both methods.

In carrying out the tests on guinea-pigs, the tinctures were diluted in the proportion of one part of tincture to three parts of normal saline; the dose was calculated per gramme body weight, and the injection made subcutaneously with a Record syringe. The pigs were observed at intervals during twenty-four hours, and note made at the end of that time as to those surviving and those dying. The following results were obtained:

TABLE I.

Sample	Minimum lethal dose for guinea-pigs in Cc. tincture per gramme body weight	Ratio
Tincture A	.00033	1
Tincture B	.00065	1.97
Tincture C	.00065	1.97
Tincture D	.00150	4.54
Tincture E	.00200	6.16
Tincture F	.00220	6.66
Tincture G	.00240	7.27
Tincture H	.00250	7.57

In testing by the cat method, the samples were diluted in the proportion of one part of tincture to nine parts of physiological salt solution. The animals were etherized, the femoral vein exposed, a cannula inserted, and the diluted tincture injected from a burette. The object was to inject the lethal dose over a period of sixty min-

utes, but the time factor seemed relatively unimportant. The ether was discontinued as soon as the injection of aconite was started. Eight samples were tested by this method. The results are given in Table II.

TABLE II.

Sample	Lethal dose for cats in Cc. Tincture per gramme body weight	Ratio
Tincture A	.000480	1
Tincture B	.001589	3.25
Tincture C	.002034	4.17
Tincture D	.001026	2.10
Tincture F	.002814	5.76
Tincture G	.003420	7
Tincture H	.003848	7.88
Tincture J	.001852	3.79

It is evident, from a consideration of these tables, that the two methods do not give identical results. This can be more readily appreciated from Table III.

TABLE III.

Sample	Guinea-pig ratio	Cat ratio
Tincture A	1	1
Tincture B	1.97	3.25
Tincture C	1.97	4.17
Tincture D	4.54	2.10
Tincture F	6.16	5.76
Tincture G	6.66	7
Tincture H	7.27	7.88

By both methods, Sample A is the strongest and Sample H is the weakest. By the guinea-pig method, Sample B is more than twice as active as Sample D, while by the cat method the latter is stronger than the former.

Why should this discrepancy exist? Both methods depend on the determination of the lethal dose, and, since the activity of aconite is due, probably, to the contained aconitine, it would seem that the ratio of strength between two different samples should be the same as determined by the two methods.

It became apparent early in the experiments upon the cats that considerable individual variations in resistance to aconite poisoning existed. This is well illustrated by the following protocol:

SAMPLE C.

Weight of cat in grammes	Lethal dose per gramme body weight	Sex
2070	.00129	Female
2700	.00499	Female
2500	.00540	Female
3100	.00064	Male
3100	.00151	Female
2320	.00116	Male
2600	.00083	Female
2500	.00439	Male

At first glance these figures are far from encouraging. Thus it is seen that cat No. 4 succumbed to a dose of 0.00064, while 0.00540, more than eight times as much, was required for cat No. 3. It will be noted that cat No. 4 was a male, while cat No. 3 was a female. If males and females are grouped separately, it is evident that the average lethal dose for the latter is much greater than for the former.

TABLE IV.

Sample	Average lethal dose for male cats	Average lethal dose for females
Tincture A	.000267	.00062
Tincture B	.000611	.00232
Tincture C	.000743	.00280
Tincture D	.000823	.00130
Tincture F	.00217	.00378
Tincture G	.00272	.00462
Tincture H	.00216	.00511
Tincture J	Insufficient number of animals	

If now we compare the results secured by the use of cats of one sex with the results secured by the use of the guinea-pig test, it is seen that closer agreements with the guinea-pig results are obtained.

TABLE V.

Sample	Male cat ratio	Guinea-pig ratio	Female cat ratio
Tincture A	1	1	1
Tincture B	2.28	1.97	3.74
Tincture C	2.80	1.97	4.51
Tincture D	3.08	4.54	2.09
Tincture F	8.12	6.66	6.09
Tincture G	10.16	7.27	7.45
Tincture H	8.09	7.57	8.24

Even in this table, however, there are certain discrepancies. Thus, acording to the guinea-pig tests, Tincture G is slightly more potent than Tincture H, while by the male cat tests the reverse rela-

tion is evident. By the guinea-pig test, Tincture C is more than twice as strong as Tincture D, while by the female cats Tincture D is decidedly the more active of the two. It is probable that these discrepancies are due to the fact that not enough animals were run on these particular samples.

Not only are the female cats more resistant than the males, but the reaction of the former is much more variable than that of the latter. This is not due to the fact that the females were lactating or pregnant, which, as pointed out by Hatcher, plays an important rôle in influencing the resistance of cats to digitalis poisoning, for we included no lactating or pregnant animals in our series.

Even when the tests with aconite were carried out on cats of one sex, we were not able to obtain the accurate results that the cat method had yielded in Dr. Hatcher's and in our own hands. It will occasionally happen that two or three cats succumb to almost exactly the same dose of aconite, but rather large individual variations are the rule. We do believe, however, that, in the present state of uncertainty in regard to the guinea-pig test, the cat method will prove a valuable means of checking the results secured by the former, and further use may prove it to possess decided advantages over the guinea-pig method.

Summary and Conclusions.

1. It has been shown that the cat method of Hatcher can be used with good results in the attempt to ascertain the strength of samples of tincture of aconite.

2. Female cats are more resistant and show greater individual variations to the toxic action of aconite than do male cats.

3. That absorption of aconite apparently occurs readily from the subcutaneous tissues of guinea-pigs.

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[4] *American Druggist,* New York, 1908, lii, p. 89.
[5] *Arch. Int. Med.,* 1915.
[6] *Jour. Am. Pharm. Assoc.,* 1913, ii, p. 705.
[7] Am. Jour. of Pharmacy, Nov., 1915, p. 489.

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THE STANDARDIZATION OF DRUGS BY THE USE OF PLANTS.

By W. M. Saylor.

In taking up this subject I realize that it is one which had some consideration in America about fifteen years ago, and one might think that it has since lost favor and has been looked upon as unworthy of any further consideration. Some experiments to determine the action of toxic substances on plants were performed in Germany as early as 1893. Under the subject, "The Toxic Action of Dissolved Salts and Their Electrolytic Dissociation," Doctors True and Kahlenberg published, in the *Botanical Gazette,* vol. xxii, year 1896, the results of their experiments on the seedling plants *Lupinus albus.* Their work was physiological and with the view of determining the maximum strength solution in which the seedlings would live. Doctor F. D. Heald, of the Wisconsin University, published in the same volume of the *Botanical Gazette,* under the subject, "The Toxic Effects of Dilute Solutions of Acids and Salts upon Plants," the results of experiments made with seedlings of *Zea Mays, Cucurbita Pepo, Pisum sativum,* and *Lupinus albus.* Doctor Heald's results were largely corroborative of those obtained by Doctors True and Kahlenberg.

The first attempt made in America to determine the toxicity or therapeutic activity of drugs by the use of plants was made by Professor Kraemer. The results of his work were published in the American Journal of Pharmacy in October, 1900. In that article Professor Kraemer mentions quite a number of plants that had been used by other experimenters.

In my experiments I used seedlings of the following: *Zea Mays, Pisum sativum, Phaseolus vulgaris,* and *Lupinus albus. Pisum sativum* and *Lupinus albus* were the only ones that gave satisfactory results, most of the experiments being performed with *Lupinus albus.*

Technic.—The seeds of the plants were soaked in water for twenty-four hours, then placed upon moist sphagnum in a dark place, at a temperature of from 18° to 20° C., and allowed to germinate. When the radicles reached a length of from twenty-five to forty millimetres they were marked, twenty millimetres from their tips, with indelible water-proof India ink.

Ordinary jelly glasses were used as containers, and fifty cubic centimetres of each solution used. Flat pieces of cork, about three by four inches, were used as covers for the glasses. One piece of cork was used to cover two glasses, and was placed so that each of two opposite corners of the cork was about over the centre of the container. A small glass rod was placed through each of these two corners. The lower end of this rod passed through an ordinary No. 6 cork which contained four staples used as carriers for four growing radicles. Hence four radicles were growing in each solution.

The seedlings were suspended so that the radicle passed through the staple and just the growing tip reached below the surface of the solution.

Every plant radicle was measured at the end of twenty-four and forty-eight hours respectively and the amount of growth recorded.

Various strength solutions of the following substances were used: Of strychnine sulphate, $^1/_{30}$ grain, $^1/_{20}$ grain, $^1/_{15}$ grain, $^1/_{12}$ grain, $^1/_{10}$ grain, $^1/_5$ grain, and then increasing by fifths on up to two grains in 50 Cc. of distilled water, were used. Of strychnine nitrate the same dilutions were made.

With both salts the $1^4/_5$-grain solution killed in twenty-four hours and the radicle did not advance in length a fraction of a millimetre, while in the $1^3/_5$-grain solution there was a growth of from one-half to one millimetre, and in the two-grain solution the radicle had shrunk and did not measure the original twenty millimetres from the mark.

In the table on page 10 is given a record of growth of seedlings in the solution of strychnine nitrate, for the first twenty-four hours. The original work contained twenty-two tables of this kind.

This table shows, as did all others, that more or less irregular growths are obtained in the weaker dilutions, while nearer the toxic point a gradual decline in activity and growth is noticed, while the toxic point is definite.

A comparison of the strychnine tables with those of distilled water showed that strychnine first stimulated the growth of the plant, but as the solutions grew stronger the plant weakened, the ultimate result being the death of the plant, just as is the case with animals.

For each toxic substance there is a definite point in strength beyond which the seedling plant under the influence of that substance will not grow or live.

Other substances used were as follows: Ethyl alcohol in dilutions of 5, 6, 7, 8, 9, and 10 per cent. Alcohol, U. S. P., 8 per cent., was toxic in twenty-four hours; *i.e.*, the radicle had not advanced in growth. Various dilutions of tincture of nux vomica, U. S. P., were used. Seven Cc. tincture in 50 Cc. distilled water killed in twenty-four hours. Two and one-half cubic centimetres of fluidextract of digitalis, U. S. P. VIII (Wyeth), in 50 Cc. water, were toxic in twenty-four hours.

The following is a record of the toxic points of the various substances used:

Tincture of digitalis made from preceding fluidextract: 8 Cc. of the tincture diluted with 50 Cc. of distilled water were toxic.

STRYCHNINE NITRATE.

Temperature, 18° to 20° C. First Twenty-four Hours.

Amount of strychnine nitrate in 50 Cc. of solution	Lupinus albus		
	Growth in millimetres	Average not counting millimetres*	Remarks
1/30 grain	12 – 14 13 – 16	14	Normal.
1/20 grain	10 – 17.5 13 – 19	14.9	Normal.
1/15 grain	10 – 18 16 – *	14.6	Normal.
1/12 grain	16 – 17 17 – *	16.7	Normal.
1/10 grain	13 – 15 13 – *	13.7	Normal.
1/8 grain	10 – 12 11 – 16	12.25	Normal.
3/8 grain	9.5 – 12 11 – 16	12.1	Normal.
3/8 grain	12 – 13 13 – 14	13.	One crooked.
1/8 grain	10 – 11.5 11 – 13	11.3	One crooked.
1 grain	7 – 8.5 7.5 – 9.5	8.1	Normal.
1½ grain	3 – 6 5 – 7	5.25	Normal.
1⅞ grain	2 – 3 2 – 5	3.	Brown.
1⅜ grain	1 – 0.5 1 – 0.5	0.75	Brown.
1⅛ grain	0 – 0 0 – 0	0–toxic	Dead and flabby.
2 grains	–1––1 –1––0.5	–0.9	Shrunk.

*Shows that for some unknown reason that plant had died.

Tincture digitalis, U. S. P., freed from fat (Wyeth): 6 Cc. of this solution was toxic.

Tincture digitalis (Lilly) (physiologically tested): 7 Cc. of this solution were toxic.

A preparation of digitalis "unknown" to me was set aside for me to tell which it was. By making dilutions and comparisons with the other tables of digitalis this preparation was determined as the fat-free tincture; this was correct. Six cubic centimetres were toxic in twenty-four hours.

A solution of strychnine sulphate of a strength unknown to me was made up. When tables of measurements were made and compared with the standard tables, the determination that the solution contained 23½ grains was made. The solution actually contained 24 grains of strychnine sulphate.

In the case of physiologically tested fluidextract of ergot, 5 Cc. in 50 Cc. of distilled water were toxic in 24 hours. Two dilutions of this fluidextract, differing in strength by 6 per cent., were made. I was to determine which was the stronger preparation. After experimentation and calculation I determined the two dilutions as being of 91 and 95 per cent. respectively, and was right concerning which was the stronger. The preparations were actually 88 and 94 per cent. respectively. This shows that the greatest variation from the actual strength was 5 per cent.

Squibb's fluidextract of ergot (about six months old) corresponded to the 95 per cent. dilution.

Another fluidextract of ergot of unknown make, but known to be a low-priced preparation, was tried and was about 77 per cent. in strength when compared with the physiologically tested preparation used as a standard.

Conclusion.—While a student can not expect to demonstrate with his spare time in one year the entire value of this subject and the correctness with which the toxicity or therapeutic activity of certain drugs can be determined, nevertheless these experiments show that there is a certain degree of reliance in this method. The method is a very cheap one, as little and inexpensive apparatus is needed, and all of these experiments were performed with about forty cents' worth of the seeds of *Lupinus albus*. If the active ingredients of a drug deteriorate or change into less active or inert substances, this deterioration would certainly be detected by the difference in

effect upon the plant in experiments performed from time to time. The method is one which any person of ordinary intelligence could use after a little experience in the work. Calculations for percentage strength are direct and easy and correct to within from one to ten per cent.

SOME RELATIONS OF PLANTS TO DISTILLED WATER AND CERTAIN DILUTE TOXIC SOLUTIONS.*

By M. C. Merrill.

(*Continued from p. 555, December, 1915.*)

In addition to the investigations already cited which deal with the practical applications of conductivity work, there might well be mentioned in this connection the work done by investigators in the Bureau of Soils of the U. S. Department of Agriculture: Whitney, Gardner, and Briggs ('97); Whitney and Briggs ('97); Whitney and Means ('97); and Gardner ('98). Heald ('02) used the Kohlrausch method for determining the conductivity of plant juices in order to get indications regarding the dissolved mineral substances in different parts of the plants under experimentation. Nicolosi-Roncati ('07), Bouyoucos ('12), Dixon and Atkins ('13, '13a) and others have also carried on conductivity determinations with different plants and under various conditions.

Sjöqvist ('95) was the first to use the conductivity method in enzyme investigations, which he did in his work on the action of pepsin on protein solutions. Similar work was done by Oker-Blom ('02), who also extended the applications of this method. Oker-Blom ('12) has recently given an account of his own and previous investigations in the field of bacteriology, wherein the electrical conductivity method was used. Various other investigators have also made use of it, among whom may be mentioned Bayliss ('07). Stiles and Jörgensen ('14) give a partial review of some of the historical aspects of this subject as it pertains to plant work.

For the conductivity work herein reported the following apparatus was used:

Wheatstone bridge (Central Scientific Co., catalogue number, 2475);

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* Reprinted from *Annals of the Missouri Botanical Garden*, vol. 2, No. 3, pp. 459-498.

Resistance box, 11,110 ohms (Central Scientific Co., catalogue number, 2444);

Induction coil (Eimer and Amend, catalogue number, 4100);

Dry battery cells (Eimer and Amend, catalogue number, 592);

Conductivity cell, Freas (Eimer and Amend, catalogue number, 5202);

Telephone receiver (Central Scientific Co., catalogue number, 2355);

Thermometer graduated to 1/10° C.;

Water tank holding 50 gallons, specially constructed for the purpose, pilot flame underneath; temperature regulated to 1/10° C.;

Tiffany laboratory motor with which to operate a stirring apparatus in the tank.

In the method employed for the work the procedure given below was consistently followed: the tumblers were always filled to approximately the 250 Cc. level with either the solution or redistilled water, depending on the culture. Before taking readings, doubly distilled water was added to bring the water or solution up to the original level, if the transpiration loss since the previous reading made the addition necessary. This was of course essential in order to keep the concentration factor under control. Readings in all cases were taken at 25° C. The control of temperature exactly to within 1/10° C. was comparatively easy by the use of the pilot flame underneath and the stirring apparatus in the tank of water.

For absolutely accurate and final quantitative determinations or ultimate values, as were required, for example, in the case of the standardization measurements for the cell constant with N/50 KCl, or the determination of the specific conductivity of the doubly distilled water, the greatest precautions possible were taken in regard to the conductivity cell and the concentration of its contents. But in making hundreds and even thousands of determinations, most of them as rapidly as accuracy permitted, due to the time factor involved, it was both impossible and unnecessary to dry the cell after each reading, since relative, and not absolute values were desired for the most part. The method employed, therefore, was to remove from the carefully stirred solution in the tumbler a 25 Cc. sample with a pipette of the same capacity, the latter having previously been rinsed with the solution. Using exactly the same amount for each determination further reduced any possibility of error due to unequal dilution in the conductivity cell. Between readings the pipette

was kept almost entirely immersed in redistilled water in a tall cylinder attached to a stand in the water bath. After carefully pouring the sample back into the tumbler, in case further readings were to be taken, the cell was rinsed twice with doubly distilled water and rapidly drained before taking the next reading, whether of the same or of a different culture. Any minute amount of doubly distilled water that might be present to dilute the next sample was a constant factor throughout all the readings and was of course inconsequential.

In using fresh batteries it was necessary to insert resistance coils between the battery and the induction coil in order to reduce the current. For this purpose German silver wire was used. While polarization phenomena may possibly be operative to a certain extent, such would be so small as to be practically negligible, especially in view of the fact that the effects from such a cause would be entirely relative and would therefore not affect the validity of the results.

Some of the conductivity results given in this paper are shown in tabular form and others are plotted as curves. In some instances the data are calculated as specific conductivity; in other cases the conductivity is represented by the value of x on the Wheatstone bridge. To make it clear what x actually represents, when the apparatus is set up as it was for the determinations, the following proportion is given:

$$R : R' :: x : 100 - x$$

R is the resistance in ohms inserted in the resistance box; R′ is the resistance in ohms of the solution; and x is the number on the bridge wire (graduated in millimeters from 0 to 100 centimeters). As the position of x on the bridge varies with R and R′, the R for each series of curves or tables will be given (though in the great majority of cases it was 9,110), from which R′ can then be calculated. Having these values, the specific conductivity can be calculated for any determined cell constant (the value of the cell used being .4088). For a fuller discussion see Findlay ('10).

IV. Recovery of Plants after being in Distilled Water for Varying Periods.

The first question studied pertained to the recovery of plants in full nutrient solution after being kept in doubly distilled water for varying periods. To determine the comparative condition for optimum recovery, the distilled water and the full nutrient medium

were renewed every four days in some cultures and left unrenewed in others, in such a way that for either condition of the medium of each set in a certain period the other medium would be both renewed and unrenewed so as to give all possible methods of combination. Examination of Table I will make this clear. Thus, for example, with cultures 11, 12, 13, and 14 of the 10-day period in distilled water the doubly distilled water in Nos. 11 and 12 was unrenewed; but when these cultures were placed in full nutrient solution this medium was unchanged or unrenewed for No. 11 and was renewed for No. 12. The distilled water in Nos. 13 and 14 was renewed, and the full nutrient solution unrenewed and renewed, respectively.

In series 1 the small variety of horse beans (*Vicia faba*) was employed, 8 plants being used to a culture. The condition of the media and duration of growth, the green weight of tops, and the dry weight of tops and roots of series 1 are given in Table I. On ex-

TABLE I (Series 1).

Effect of Renewed vs. Unrenewed Media on Growth of Horse Beans.

Culture no.	Length of period in dist. H_2O days	Dist. H_2O renewed or unrenewed	Length of period in full nutr. days	Full nutr. renewed or unrenewed	Green wt. of tops gms.	Dry wt. of tops gms.	Dry wt. of roots gms.
1	45	Unrenewed	..	.....	2.15	.777	.124
2	45	Unrenewed	..	.....	1.75	.666	.096
3	45	Renewed	..	.....	4.40	.887	.272
4	45	Renewed	..	.....	4.40	.870	.235
5	1	Unrenewed	44	Unrenewed	16.30	2.069	.485
6	1	Unrenewed	44	Renewed	27.00	3.069	.707
7	2	Unrenewed	43	Unrenewed	15.85	1.994	.429
8	2	Unrenewed	43	Renewed	32.51	3.543	.743
9	5	Unrenewed	40	Unrenewed	18.90	2.315	.463
10	5	Unrenewed	40	Renewed	26.25	2.895	.700
11	10	Unrenewed	35	Unrenewed	13.35	1.623	.382
12	10	Unrenewed	35	Renewed	26.35	2.928	.697
13	10	Renewed	35	Unrenewed	14.90	1.887	.463
14	10	Renewed	35	Renewed	22.90	2.376	.548
15	15	Unrenewed	30	Unrenewed	14.00	1.719	.388
16	15	Unrenewed	30	Renewed	18.05	1.880	.457
17	15	Renewed	30	Unrenewed	15.60	1.807	.417
18	15	Renewed	30	Renewed	21.20	2.403	.642
19	20	Unrenewed	25	Unrenewed	12.51	1.447	.300
20	20	Unrenewed	25	Renewed	11.40	1.247	.328
21	20	Renewed	25	Unrenewed	11.40	1.319	.284
22	20	Renewed	25	Renewed	15.50	1.670	.454
23	..	.....	45	Unrenewed	14.60	1.975	.419
24	..	.....	45	Unrenewed	14.70	2.044	.443
25	..	.....	45	Renewed	27.85	2.925	.690
26	..	.....	45	Renewed	27.05	3.025	.764

amining this table it is seen that even after the plants had remained for 20 days in distilled water, they recovered on being placed in the full nutrient solution, while those remaining for 10 days in distilled water produced practically as much growth when later placed in the full nutrient solution as did the plants which were in the latter medium during the entire period.

Of course, as would be expected, the cultures wherein the full nutrient solution was renewed every four days gave much better growth than did those in the unrenewed medium, due, no doubt, to an increased amount of available nutrients. But an interesting comparison is manifest in connection with the effect of renewing the distilled water; the greater growth of both tops and roots may be noted in cultures 3 and 4, in which the distilled water was renewed every four days throughout the period, as compared with that of cultures 1 and 2, where the distilled water was not renewed, except, of course, for the occasional addition of water to replace the transpiration loss, which, however, was small. Furthermore, in noting the growth of cultures 11–22, inclusive, it is seen that in four of the six cases of comparison between the renewed and unrenewed distilled water, better growth of both tops and roots resulted where the distilled water was renewed. Considering cultures 1–4 and 11–22, inclusive, the total green weight of tops for the unrenewed distilled water as compared with the renewed distilled water, and the same conditions for the dry weight of tops and roots, gave the results to be seen in Table II. The total weight in all cases is therefore greater in the cultures in which the distilled water was renewed.

TABLE II (Series 1).

Effect of Renewed vs. Unrenewed Distilled Water on Growth of Horse Beans.
(Summarized Results of Part of Table I.)

Medium	Green weight of tops in grams	Dry weight of tops in grams	Dry weight of roots in grams
Water renewed.....	110.30	13.219	3.315
Water unrenewed...	99.56	12.287	2.772

These results therefore indicate that the so-called injury to plants in distilled water cannot be entirely or even satisfactorily explained on the basis of extraction of solutes from the plant tissues. If that were the case we should have the greatest injury and least recovery in those cultures in which the distilled water was renewed, the peri-

odically renewed water effecting *in toto* a greater exosmosis of the salts than the water which is not renewed. This statement will receive verification under the section on conductivity measurements. It would therefore seem that we must seek other explanations for the phenomena observed when plants are placed in distilled water. This phase of the subject will also be discussed later.

The points noted will be clear from an examination of pl. 13 figs. 1 and 2. Plate * 13 fig. 1 shows the various stages of recovery after varying periods in the distilled water. The better growth is to be noted of both tops and roots of No. 2, in which the distilled water was renewed, as contrasted with No. 1, in which it was not renewed. It is interesting to observe how plants, even after 20 days in distilled water, will recover in full nutrient solution and then give even better growth than plants in unrenewed full nutrient solution the entire period, and that after 10 days in distilled water, plants will recover in renewed full nutrient solution and equal in growth plants grown the entire period in renewed full nutrient solution.

Plate * 13 fig 2 shows first (Nos. 1 and 2) the contrasted effect of renewing and not renewing the full nutrient solution. The remaining 8 cultures of the plate show the effect of renewing and of not renewing both the distilled water and the full nutrient solution. In cultures 3–10 the comparison should, of course, be made between the alternating numbers for the distilled water effect (renewed or not renewed), and between successive numbers for the effect of the renewal or the non-renewal of the full nutrient solution. While the culture represented by No. 7 of the plate gave greater growth than did No. 9, that excess was probably due to the individual hardihood of two plants. It is seen that a much more uniform and desirable growth was made by the plants of No. 9.

An interesting point in connection with the horse beans is that 16 days after setting up the series the tips of those plants still in distilled water were more or less blackened, probably as a result of enzyme (oxydase) action, and many of them were considerably inrolled. Such conditions were entirely absent from the cultures in full nutrient solution at that time. When the affected plants were later placed in full nutrient solution there was a gradual recovery from the blackening of the leaves, and this recovery was greater in the case of those cultures in which the distilled water had been renewed than in those in which it had not been renewed. Twenty

* See illustrations in the original article.

days later Nos. 3 and 4 were in very much better condition than Nos. 1 and 2. There was much less blackening, some leaves not being blackened at all. The general height of the plants in Nos. 1 and 2 was 1½–2½ inches; and in Nos. 3 and 4 it was 2½–4 inches. A very noticeable feature at the end of the experiment was the condition of the medium, that of Nos. 3 and 4 being of course clear while that of Nos. 1 and 2 was milky, turbid, and opaque, indicating abundant fungous and bacterial action, a condition further emphasized by the hyphal threads and gelatinous coating on the roots.

The roots of the plants in Nos. 3 and 4 were also in much better condition at the end of the experiment than were those of Nos. 1 and 2, especially as regards length and the amount of lateral root development. The root growth in No. 13 at the end of the experiment was also greater than that in No. 11; but in Nos. 12 and 14 it was about equal. The plants of No. 17 also showed greater root growth than did those of No. 15, and this difference was more marked than in the case of the tops. The lateral roots in No. 17 were produced all along the main roots, while in No. 15 they were practically confined to the upper or older portion of the main roots. Another interesting difference observed was that in No. 17 the main root tips were not permanently injured in the distilled water and when placed in the full nutrient solution they continued growth. This was not the case in No. 15. In general there was not much difference between the roots in Nos. 16 and 18; the plants in No. 18, however, had slightly greater growth of roots and showed less injury and some continuation of growth of the tips, whereas those in No. 16 did not. The same condition of the roots above noted for Nos. 15 and 17 held also in Nos. 19 and 21, respectively; but the difference in favor of the renewal of the distilled water though less marked was nevertheless evident. Likewise, Nos. 18 and 20 were similar to Nos. 16 and 18, respectively.

Strong evidence was therefore afforded by the cultures of horse beans that renewing the distilled water has a favorable effect upon the plants.

Series 2 is in every respect a duplicate of series 1 except that Canada field peas (*Pisum sativum*) were used instead of horse beans (*Vicia faba*), and that the dry weight of the tops was not determined; furthermore, the length of the experimental period was different. The condition of the media and duration of growth, the green weight of tops, and the dry weight of roots are given in

Table III, seven plants being grown in each culture. An examination of this table reveals results similar in many cases to those contained in Table I; plants recovered even after 20 days in distilled water, but after 10 days in this medium the recovery was not so complete as in the case of the horse beans, for the plants so treated did not equal in growth similar ones which had remained in full nutrient solution the entire period. However, plants which had been in distilled water only 5 days before being transferred to full nutrient solution subsequently equalled in growth other plants which had been in the latter medium from the start. The period between 5 and 10 days in distilled water is therefore a critical one, and will be discussed later in other connections.

TABLE III (Series 2).
Effect of Renewed vs. Unrenewed Media on Growth of Peas.

Culture number	Length of period in dist. H_2O days	Distilled H_2O renewed or unrenewed	Length of period in full nutr. days	Full nutrient renewed or unrenewed	Green weight of tops grams	Dry weight of roots grams
1	47	Unrenewed	..	.....	.80	.073
2	47	Unrenewed	..	.....	.60	.076
3	47	Renewed	..	.....	.45	.067
4	47	Renewed	..	.....	1.30	.091
5	1	Unrenewed	32	Unrenewed	6.75	.400
6	1	Unrenewed	32	Renewed	11.05	.500
7	2	Unrenewed	31	Unrenewed	5.50	.401
8	2	Unrenewed	31	Renewed	12.90	.568
9	5	Unrenewed	28	Unrenewed	5.95	.263
10	5	Unrenewed	28	Renewed	12.35	.467
11	10	Unrenewed	23	Unrenewed	5.35	.254
12	10	Unrenewed	23	Renewed	7.90	.321
13	10	Renewed	23	Unrenewed	3.80	.160
14	10	Renewed	23	Renewed	6.07	.202
15	15	Unrenewed	18	Unrenewed	3.30	.144
16	15	Unrenewed	18	Renewed	4.40	.175
17	15	Renewed	18	Unrenewed	4.30	.162
18	15	Renewed	18	Renewed	4.15	.169
19	20	Unrenewed	13	Unrenewed	3.21	.124
20	20	Unrenewed	13	Renewed	2.52	.092
21	20	Renewed	13	Unrenewed	4.05	.139
22	20	Renewed	13	Renewed	4.43	.141
23	..	.....	33	Unrenewed	5.50	.368
24	..	.....	33	Unrenewed	6.94	.420
25	..	.....	33	Renewed	9.60	.536
26	..	.....	33	Renewed	13.45	.611

Renewing the full nutrient solution again showed beneficial results, as might be expected. But the renewal of the distilled water did not produce such striking results in some respects as in the

case of the horse beans; in other ways, however, the results were equally or even more striking. Where the plants remained in distilled water for 47 days the growth was better in one case and poorer in the other where the distilled water was renewed than where it was not renewed. The average growth, however, of the two cultures in the renewed medium was better than that of the two in the unrenewed distilled water.

In Nos. 11–22, there was better growth of tops and roots in four cases where the distilled water was renewed and better growth in four cases where it was not renewed. Considering cultures 1–4 and 11–22 the results given in Table IV were obtained, from which it is again evident that renewing the distilled water exercises no injurious influence, and the conclusion is reinforced that an exosmosis of mineral nutrients is not the fundamental basis of the injury which plants suffer in distilled water. Furthermore, the difference between the renewed and the unrenewed distilled water cultures was very marked if the plants remained for 20 days in distilled water before being changed to the full nutrient solution, the difference being greatly in favor of the cultures in which the medium was renewed.

TABLE IV (Series 2).

Effect of Renewed vs. Unrenewed Distilled Water on Growth of Peas.

(Summarized Results of Part of Table III.)

Medium	Green weight of tops in grams	Dry weight of roots in grams
Distilled water renewed....	28.55	1.131
Distilled water unrenewed .	28.08	1.259

Figures 1 and 2 of pl. 14 illustrate the points above mentioned. In pl. 14 fig. 2 should be noted the better growth of Nos. 9 and 10—which were in renewed distilled water for 20 days before transfer to full nutrient solution—as compared with Nos. 7 and 8, which had remained in unrenewed distilled water for the same length of time before transfer. The excess of growth in No. 4 over that in No. 6 is probably to be accounted for on the ground that since those cultures were in distilled water but 10 days neither the renewal nor the unrenewal of the medium exercised much effect. Hence the greater growth of No. 4 represents an individual variation.

At the expiration of the experimental period the following conditions prevailed in series 2: while the top growth in cultures 1–4 was

about the same in each case, the root growth in Nos. 3 and 4 was much better than that in Nos. 1 and 2, the roots of the former being whiter, cleaner, and having longer and more numerous lateral roots. In the case of those cultures grown in distilled water 10 days before removal to full nutrient solution, Nos. 11 and 12 were in somewhat better condition than Nos. 13 and 14, a difference which might readily be expected for the shorter periods in distilled water due to individual variation. After 15 days in distilled water and 18 days in full nutrient solution the benefits derived from renewing the former were markedly evident in the appearance of cultures 15–18, even though the actual weights did not show such difference. Nos. 17 and 18 were in better condition than Nos. 15 and 16, respectively, especially as regards the root growth; similarly, Nos. 21 and 22 were in better condition than Nos. 19 and 20, respectively.

Some special conditions which are of particular interest were observed when the cultures were examined carefully at the close of the experiment. The first point pertains to the method of recovery. After being in the distilled water only one or two days the top growth of such cultures when placed in full nutrient solution proceeds unhindered from the tips of the main stems, *i.e.*, the tips of the stems remain uninjured and resume growth. But 5 days in distilled water almost marks the limit at which growth can be resumed at the tip of the main axis of the stem when such cultures are subsequently placed in full nutrient solution. After 10 days in distilled water the tips of the stems become injured so that the later growth in full nutrient solution is made from new lateral branches. Hence the period from 5 to 10 days in distilled water before removal to full nutrient solution may be considered a crucial period as regards the recovery and growth of the main stems.

Another point of interest is the delayed maturity which results in the case of the cultures which are grown for some time in distilled water and later are placed in full nutrient solution. Such plants remain in a green and growing condition much longer than do those which have been in full nutrient solution for the entire period, or those which remained in distilled water for a shorter period before being transferred to the full nutrient solution. The growing season of the former is thus prolonged and the date of maturity delayed.

The foregoing series having given evidence of the recovery of plants in full nutrient solution after being in distilled water for 20 days, the question arose as to the maximum length of time plants

might remain in distilled water without preventing recovery when subsequently transferred to full nutrient solution. Series 3 was therefore set up. This consisted of cultures of Canada field peas grown in distilled water for 10-, 20-, 30-, 40-, and 50-day periods before transfer to the full nutrient medium. The condition of the media and duration in each and also the results of the series (as shown by the green weight of tops) are given in Table V, Nos. 1–20, inclusive. Renewals in this series also were made every four days. Nos. 21–28 under different conditions and concentration of nutrient solution are given for purposes of comparison. The maximum time limit in distilled water above referred to is thus seen to be approximately 30 days, and this was practically attained only in case of the cultures in renewed distilled water.

TABLE V (Series 3)

Growth of Peas in Renewed and Unrenewed Media for Various Periods up to the Maximum Time for Survival. Also Effect of Adding Water at Different Intervals to Media Under Various Conditions.

Culture number	Length of period in distilled H_2O days	Distilled H_2O renewed or unrenewed	Length of period in full nutrient days	Full nutrient renewed or unrenewed	Green wt. of tops grams
1	10	Unrenewed	42	Unrenewed	4.50
2	10	Unrenewed	42	Renewed	8.00
3	10	Renewed	42	Unrenewed	4.85
4	10	Renewed	42	Renewed	6.30
5	20	Unrenewed	32	Unrenewed	2.70
6	20	Unrenewed	32	Renewed	5.05
7	20	Renewed	32	Unrenewed	3.55
8	20	Renewed	32	Renewed	1.40
9	30	Unrenewed	22	Unrenewed	.55
10	30	Unrenewed	22	Renewed	1.30
11	30	Renewed	22	Unrenewed	1.90
12	30	Renewed	22	Renewed	1.90
13	40	Unrenewed	12	Unrenewed	.50
14	40	Unrenewed	12	Renewed	.55
15	40	Renewed	12	Unrenewed	.65
16	40	Renewed	12	Renewed	.72
17	52	Unrenewed	..	.....	.60
18	52	Unrenewed	..	.....	.45
19	52	Renewed	..	.....	.56
20	52	Renewed	..	.....	.55
21	Unrenewed full nutr. 42 days, dist. H_2O added every 8 days				6.40
22	Unrenewed full nutr. 42 days, dist. H_2O added every 4 days				6.00
23	Renewed full nutr. 42 days, the sol'n renewed every 8 days				8.75
24	Renewed full nutr. 42 days, the sol'n renewed every 4 days				18.50
25	Unrenewed 1/10 full nutr. 42 days, dist. H_2O added every 4 days				2.90
26	Unrenewed 1/5 full nutr. 42 days, dist. H_2O added every 8 days				2.95
27	Renewed 1/10 full nutr. 42 days, sol'n renewed every 4 days				10.10
28	Renewed 1/5 full nutr. 42 days, sol'n renewed every 8 days				7.85

(To be continued.)

HENRY T. HELMBOLD, "THE BUCHU KING."*

On a part of the first floor of the Continental Hotel, with a Chestnut Street front by the side of the main entrance, there used to be, in the days when the hotel was the foremost rendezvous in Philadelphia for both national and local men of distinction—or what the Fifth Avenue then was to New York and the Palmer House to Chicago—a flashing, brilliant drug store, full of color and light and mirrors and prismatic glasses, and in front of it a crystal-like pestle with the name "Helmbold's" in letters which seemed to allure the public eye. In the '70s, and indeed long before that time, through the advertising columns of the newspapers there was perhaps no other name more known to everybody in the city in connection with boldly eccentric and sometimes fantastic exploitation. Of all the advertisers of patent medicines who have compounded fortunes, in short order, out of insistent methods of projecting their names and their vocations continually before the public eye, there has probably been none who was quite so much an object of bewildered wonderment and amazement to not only quiet and conventional people in Philadelphia, but sometimes to the liveliest men of the world, as Henry T. Helmbold, or Doctor Helmbold, as he always called himself, with as much impressiveness as if he were a Virchow or a Pasteur. One medicine in particular which he proclaimed everywhere with as much of a triumphant stir as if he were the greatest benefactor of humanity was called Buchu; multitudes of people were persuaded that it was the chief medical "discovery" of the nineteenth century, and it was one of the favorite devices of Helmbold to have himself heralded in the advertising columns of the press as the "Buchu King."

Nor was there any other man in Philadelphia whom city editors and reporters were more likely to watch or inquire after as a source of news than this luxurious son of audacity and ostentation. At times he seemed to be so wild in his eagerness to claim attention that it was difficult to determine whether he was simply exaggerating the methods of Barnum or whether his wits were diseased. On

* The above article, written by "Penn" in the *Philadelphia Evening Bulletin* of July 21, 1915, is deserving of a place in the history of proprietary medicines. The career of Helmbold well illustrates what was possible at a time when the practice of medicine was probably at its lowest ebb in the United States.—EDITOR.

Chestnut Street, on Broad Street, in Fairmount Park, there were no horses and carriages like his; his person sparkled with diamonds, and his dinners were talked of in language which might have befitted the feasts of Lucullus. He was constantly in the habit of causing reports to be circulated concerning his intimacy with statesmen and foreign potentates, his elaborate plans for the construction of palatial mansions, his munificence as a patron of art, and the sensational joys of his European travels. But after all allowance was made for his boasting and for his tricks as a charlatan in the allurements of publicity, it had to be acknowledged that he did things with his money such as nobody outside of Kirkbride's or a comic opera would have thought of doing, and that if there was humbug in him as the "Buchu King," there was plenty of reality in him as the King of Sports.

Helmbold's beginnings in Philadelphia had been humble. It used to be said of him that he came from the country when a youth and that he found employment at the Market Street drug store of George W. Carpenter, whose home and grounds in Germantown were one of the suburban "sights." With an extremely buoyant and ambitious temperament and with a boundless faith in himself, he learned enough in the drug house to understand how first-rate profits could be made in the business when it was carried on carefully, and how enormous profits could be made in it when it was carried on boldly. Accordingly he rented a small store in the vicinity of Powers and Weightman's chemical works at Ninth and Brown Streets, began to make what he called "Buchu," described its origin as a mysterious African plant, and sold enough of it to the credulous to enable him to come downtown and fit up a pharmacy and "laboratory" on Chestnut Street, near Tenth. Still a young man, he made up his mind that he would spend on the newspapers all the money that he could spare and that he would thus repeat the tactics of Dr. Jayne in becoming a millionaire. His success went beyond all expectations. He could not prepare the medicine quickly enough to meet the flood of orders that soon began to pour in on him. Instead of half a column, he took a full column and then two columns—this was then a very big advertisement—in each of the principal newspapers. There was no newspaper in Philadelphia which he would not use if it had a thousand readers who, he could be assured, visited the drug stores. Most other advertisers felt that they were pigmies as compared with him. Twenty thousand,

fifty thousand, a hundred thousand, finally a quarter of a million dollars a year were believed to be expended by him at a time when probably no merchant or commercial firm expended annually a half of the maximum of these amounts. He declared not only that no man in Philadelphia had gotten rich so rapidly as he had, but that none who had ever done so deserved it so much as he did.

In the course of time he turned his attention to New York also as a field not only for the great Buchu, but for the display of his own opulent and imposing self. When the once-celebrated Metropolitan Hotel which was situated on what is now lower Broadway and to which Niblo's Garden theatre was a notable adjunct, was still in the fulness of its glory, he lavished a fortune on the equipment and decoration of a "pharmacy" in a part of the hotel. His expenditures in the hotel as a dinner host and wine-opener were said to have been greater than those of anybody that had ever entered its doors, "Coal-Oil Johnny" not excepted. He bought one of the finest houses in what was then the Fifth Avenue district, furnished it with the splendor of a palace, and seemed to set up a rivalry to "Jim" Fisk in catching public attention as a "high-flyer." Sometimes, garbed in clothes such as a gentleman of quiet and modest tastes might wear, without color or jewelry, he would drive on the principal streets with a magnificently dressed coachman and a pair of footmen blazing with scarlet coats, and at Long Branch, where President Grant had his "summer capital," Helmbold and his wife, who had the reputation of being a clever as well as a beautiful woman, set up what the wits called "the Court of the Prince of Buchu." Helmbold emphatically declared that his wife was the finest specimen of her sex in America and that in Europe there was no one to be compared to her, unless it was the Empress Eugenie.

It was in Europe that some of Helmbold's adventures caused such a stir that he was burlesqued on the Parisian stage as a typical American of the upstart breed. His banquets and receptions were compared to those of nabobs from Oriental countries, and on one occasion he had the Shah of Persia as his guest in the midst of superb scenes of Persian luxury, the most skilful designers of palatial furnishings in Paris having been instructed to contrive such embellishments as would make the potentate feel that he was, for the moment, in his own Teheran. Meanwhile, in that portion of the boulevard press which lives on the arts of puffery as well as blackmail, Helmbold

was praised to the skies as one of the world's self-made men, a savant and philanthropist who would be worthy of a place among America's "Forty Immortals," if there were an Academy on our side of the Atlantic. But about this time there were some signs, in his speech and behavior, which indicated that he was influenced by other motives than cunning and money-making in paying out fortunes for all this display as well as the inordinate eulogies of the press. It began to be whispered that he ought to be regarded by wise people not so much with disgust as with pity. Some of his behavior had been called eccentric, but men who watched him closely shook their heads and said that he was rapidly becoming a victim of vicious exercises and the excitation of disordered nerves. In Philadelphia it had been supposed that his apparent follies had all been planned chiefly with regard to their effects on the business in "Buchu." But however this may have been, the feverish, extravagant and fantastic joys which he found in Paris were altogether too much for him, and at last the suspicion that he had really been out of his mind at times was confirmed by his boisterous exhibitions of rage over the slightest trifles and a frantic attempt to slay his wife. It soon became necessary to put him in a madhouse; his escape from it enabled him to get back to this country, and here the controversies, litigation, commitments and escapes in which he was concerned for a number of years quite equalled in sensational effect and almost exceeded in duration the contests which Harry Thaw has made on the question of his lunacy. All his financial affairs went to pieces, and for a while he was an inmate of the Kirkbride Asylum in West Philadelphia. Subsequently, after having had some partial return of his reason, he died in another hospital utterly crazy.

The famous drug store in the Continental had passed into the control of or possession of his brother Albert, who was also a familiar character among men about town, but who had little or none of the dash and genius of "the doctor" as an advertiser. When the affairs of the Helmbolds were before the courts, all sorts of stories came out concerning the vagaries and escapades of the "Buchu King"—how he contemplated buying the Continental and turning it into a huge laboratory, how he was going to take charge of the Medical School of the University of Pennsylvania over on Ninth Street, how he had formed a plan of leading an expedition into Africa in order to "discover" new plants for medical uses, and

how he had intended to raise a great campaign fund for nominating himself as a candidate for President of the United States against Grant. When he was sane, or, at least responsible and at large, he always avowed, with gushing frankness, that to the newspapers was due everything that he was and everything that he had. "No fellow can get along," he would say, "who doesn't advertise; the great thing is never to let the public forget you." It was one of his boasts that for every one Philadelphian who had heard of such able men as Doctor Gross and Doctor Pancoast, there were ten thousand who had heard of "Doctor" Helmbold. In a genial but brazen defiance of what we call the conventionalities and in a vainglorious love of money simply as a means for obtrusion and display, it is doubtful whether there had been before, or has been since, a like Philadelphian on the promenades of Chestnut Street. To sarcasm and to ridicule he was apparently insensible; no one could talk him down or laugh him down, and when he passed along the Continental he was prouder of himself than any peacock could be with a full-spread tail. As it used to be the habit to call "Bob" Fox, of the famous "Varieties," the wickedest man in the city, so it was to call "Doctor" Helmbold the liveliest, and he was probably quite as much in earnest as he seemed to be in jest when he frequently declared that he would become so rich that Chestnut Street would some day be known as Helmbold Avenue!

Nowhere outside of the stage and the madhouse could anyone have found his duplicate.

CORRESPONDENCE.

Whisky and Brandy in the U. S. Pharmacopœia.

The Executive Committee of the National Association of Retail Druggists, in session in Chicago the week of December 6, 1915, unanimously approved the following resolution:

"Whereas, The deletion of whisky and brandy from the United States Pharmacopœia by the committee on revision has not met with the approval of the medical and pharmaceutical professions throughout our country; and

"Whereas, The action of the Federal authorities relative to the standard for whisky can not set aside the decree of Congress in so

far as the Pharmacopœia is recognized as a standard for medicinal substances, whatsoever may be its effect upon food standards, and can not apply in intrastate pharmacy where the Pharmacopœia is the legal standard; and

"WHEREAS, We consider that the liquor question should not influence the sound judgment, wisdom, and intelligence of the revision committee of the United States Pharmacopœia; therefore be it

"*Resolved,* That we respectfully and earnestly suggest to the point of insistence that the revision committee reconsider the vote on this most important question, and we strongly desire that there be included in the ninth revision of the United States Pharmacopœia monographs on whisky and brandy containing satisfactory descriptions and tests for the identification of whisky and brandy suitable for medicinal purposes."

In connection with the above resolution letters have been received from the secretaries of the National Association of Retail Druggists and the Minnesota State Pharmaceutical Association, as follows:

DEAR MR. KRAEMER:

The above resolution was authorized and endorsed by the N. A. R. D. Executive Committee at its annual meeting in Chicago the week of December 6, after a full and free discussion of the subject.

The deletion of whisky and brandy from the standardized publication, from our point of view, was a big mistake and calculated to work an immense injury to the retail drug trade of the entire country. This is not to be construed from an economic point of view, but from a broader and moral point. You well know that this deletion would not of itself stop the sale for medicinal purposes, but it would legalize the sale of any substitute mixture, provided it did not contain wood or denatured alcohol or deleterious matter.

Trusting that a reconsideration of the recent vote on this most important subject may be moved in the early future, we are,

Fraternally yours,

T. H. POTTS,
Secretary.

My Dear Professor Kraemer:

I enclose copy of a resolution unanimously approved by the Executive Committee of the National Association of Retail Druggists, in session in Chicago the week of December 6, 1915.

The matter of the deletion of whisky and brandy from the Ninth Revision of the United States Pharmacopœia has been discussed for sometime by pharmacists throughtout the Northwest. The consensus of opinion among pharmacists in this section of the country undoubtedly is that, inasmuch as whisky and brandy are frequently prescribed by physicians to be used for medicinal purposes, suitable standards should be provided for these substances in the Ninth Revision of the Pharmacopœia. The chief reason for deleting whisky and brandy appears to be the questionable value of these substances as remedial agents. The more or less extensive prescribing of whisky and brandy by physicians at the present time not only warrants the continuation of these products in the Pharmacopœia, but demands that they be continued if pharmacists are to serve physicians most satisfactorily.

The writer understands that monographs suitable for whisky and brandy have already been prepared for the U. S. P. IX, and believes that Northwestern pharmacists would vote almost unanimously in favor of having these included in the new Pharmacopœia. I, therefore, request that you, as a member of the revision committee, give due consideration to the enclosed resolution.

Yours sincerely,

E. L. Newcomb,
Secretary.

Minnesota State Pharm. Ass'n, Northwestern Branch, American Pharm. Ass'n.

BOOK REVIEWS.

An Introduction to Bacteriology for Nurses. By Harry W. Carey, A.B., M.D. Philadelphia: F. A. Davis Company, 1915. Price, $1 net.

The number of books on bacteriology are likely to equal those in elementary chemistry. Many of them necessarily contain but little more than the matter in standard works. This great output of bacteriological books is not likely to be criticised at present, as the subject concerns the interest of public health and is deserving of the widest publicity. Dr. Carey's work is among the first books

especially adapted for the training of nurses. The author has had a somewhat extended experience in teaching the nurses of the Samaritan Hospital Training School of Troy, N. Y. Furthermore, Dr. Carey is the city bacteriologist in Troy, and therefore well prepared to write a work for the use of nurses. It is an excellent book and one deserving of a wider class of readers. Throughout the book is given instruction to nurses and attendants in the handling of patients who are affected with bacterial diseases. The facts are well stated and the information it contains is both instructive and interesting.

BERICHT VON SCHIMMEL & Co. (Inhaber Ernst, Karl u. Hermann Fritsche) in Miltitz Bez. Leipzig, über Ätherische Öle, Riechstoffe u.s.w., October, 1915.

This semi-annual monograph of Schimmel & Co. gives a *résumé* of the scientific progress and other work connected with essential oils that has been accomplished within the past six months. The text relating to volatile oils in both the British and Finnish Pharmacopœia is critically considered. We anxiously await the appearance of the English translation, so that we can more easily republish some of the matter contained in this *Bericht.* The present numbers are doubly valuable, coming during these strenuous times, and reflect the highest type of patriotism, as the information concerns all users of essential oils.

THE "WELLCOME" PHOTOGRAPHIC EXPOSURE RECORD AND DIARY, 1916. Price, 50 cents net.

Photography continues both to serve and to fascinate, and this little volume stands preëminent as a useful guide to the art in its varied phases. It maintains and has extended its reputation as a concise encyclopædia of photographic information, ranging from simple routine operations to the developments of the higher photography. It forms and advises on everything—on photography by night and the correct quantities of flashlight powder; on green, or sepia, or blue toning of bromides, or warm tones on gaslight papers; on time and factorial development, the intensification of color plates, exposures for interiors, the speeds of bromide papers, the staining of prints, etc. Not one of the varied aspects of the art appears untouched; and, besides all this, there are instructive tables, simple formulæ, and a multitude of useful hints.

Of especial value is the "Wellcome" Exposure Calculator, an ingenious rotary device, fixed to the back cover, which, by one turn of one scale, indicates the correct exposure of any plate or film at any time of day or year. For British, Colonial, American, and Continental plates and films independent exposure factors are given. The illustrations have always been a feature of this publication—not only because they are the work of leading experts, but because they are reproduced with great skill and taste. This year there are included examples of the work of two leading American photographers, Merl La Voy and Robert G. Weyh, Jr.

CURRENT LITERATURE.

Oleoresin of Aspidium.

The Physical and Chemical Properties of the Oleoresin of Aspidium with Respect to the Detection of Adulterations.—The adulteration of the extract is not limited to the addition of foreign substances to the finished product, but begins with the drug from which it is prepared. The forms in which the drug is contaminated may be conveniently classed under three heads: (*a*) the substitution of old, deteriorated rhizomes for the fresh, active drug; (*b*) the admixture of the chaff and dead stipe bases with the rhizomes; and (*c*) the addition of the rhizomes of other species of ferns to those of the official species. The first form of adulteration is, perhaps, the most common and most widely spread.

The present methods of assaying the extract of male fern do not give results which indicate its therapeutic value. It is admitted by Dr. DuMez that the properties of the extract tabulated in his paper can not be used as factors for measuring the degree of activity; they only can serve as a means of distinguishing between an extract recently prepared from fresh, green rhizomes and that prepared from old rhizomes or in detecting a deteriorated or adulterated product. Viewed from this standpoint, the following conclusions can be drawn: The color of the extract, when prepared from rhizomes, is yellowish-green; a brownish shade indicates the use of old rhizomes; deep green means the addition of chlorophyll or other foreign coloring material, such as a salt of copper. The use of old rhizomes receives further confirmation in a low index of refraction (the refractive index is also lowered by the addition of castor oil) and in the dark

color of the ethereal solution of the crude filicin obtained in the filicin assay. The presence of a copper salt can best be confirmed by an examination of the ash, applying the usual tests for copper. The addition of chlorophyll is difficult to detect chemically, owing to its presence as a natural constituent of the extract. However, the amount which must be added to obscure the brown color imparted by old rhizomes is so great that it can easily be detected with the naked eye in the original sample and in the solubility tests.

The addition of castor oil to the extract produces a considerable change in all of its properties. It is especially indicated in the low specific gravity, index of refraction, and iodine and saponification values. Its presence can be most easily confirmed by the solubility tests.

The presence of aspidin can be readily determined by Hausmann's method, which serves as a practical means of detecting the use of *Aspidium spinulosum* Sw. in the preparation of the extract.

The use of acetone as directed in the United States Pharmacopœia yields a product which separates in two layers upon standing—an upper oily layer and a lower layer darker in color and thicker in consistency than that above. This in itself serves as a ready means of detecting its use, which is further confirmed by the solubility tests and the high ash content.

The iodine and saponification values vary in the same direction as the filicin content, and, therefore, might be used to displace the rather long and expensive method of the present filicin assay. Especially is this true in the case of the saponification value, which requires but one gramme of the extract and less than an hour to complete. (By A. G. DuMez, *The Philippine Journal of Science*, vol. viii, No. 6, Sec. B, Tropical Medicine, December, 1915.)

J. K. THUM.

FIFTY FALSELY LABELLED MEDICINES.

More than half a hundred legal actions have been terminated successfully under the Sherley Amendment to the Food and Drugs Act, which prohibits false and fraudulent claims as to the curative or therapeutic effects of drugs or medicines. Criminal prosecutions against the manufacturers were brought in 25 cases, but in 31 instances the falsely and fraudulently labelled medicines were seized while in interstate commerce. Claims made by the manufacturers for the curative powers of these preparations ranged from tubercu-

losis, small-pox, and diphtheria to coughs, colds, and scalp diseases. A number of other criminal prosecutions and seizures are pending in various Federal courts throughout the United States because of alleged violations of the Sherley Amendment similar to those which have already been tried. The officials charged with the enforcement of the Food and Drugs Act are of the opinion that the evils of the patent-medicine business can be stopped only by the most drastic action.

It is pointed out that traffic in medicines for which false and fraudulent claims are made is not only an economic fraud of the worst kind, in that a worthless preparation that costs but a few cents is frequently sold for a dollar or more a bottle, but that health, and even life, is endangered by failure to secure the service of a physician in such serious diseases as tuberculosis, diphtheria, pneumonia, and scarlet fever until too late, because reliance may have been placed in the curative powers of some worthless preparation which is claimed to be a never-failing remedy. The deluded victim may not realize his danger until the disease has reached a stage too far advanced for even the ablest physicians to cope with it. Effective treatment depends in most cases on applying it during the early stages of the disease.

The Houchens Medicine Company of Baltimore, Md., pleaded guilty to the charge that a preparation called "Family Physician" and shipped by them into interstate commerce was falsely and fraudulently labelled. Among the many diseases for which this medicine was recommended by the manufacturers in statements appearing on the labels and accompanying circulars were diphtheria, scarlet fever, typhoid fever, small-pox, bronchitis, neuraglia, croup, and all diseases of the throat and lungs. The following quotations from the label, carton, or circular are interesting: "The public is hereby assured that this is the genuine and original family physician. . . . For fever you need not give anything else but this medicine; it will keep the rash out itself. . . . For cases of small-pox take plenty and often. . . . Use freely. Give no hot teas; just give the medicine, and what pimples are under the skin will come out, the rest will be carried off by the medicine. . . . Also a wonderful and positive remedy for dyspepsia, keeps measles out nicely, regulates the bowels without trouble, and by purifying the blood prevents your liability to disease."

Analysis of the product, which was claimed by the manufacturer

to be effective in the treatment of so many virulent and contagious diseases, as well as a variety of minor ills, showed that it was a syrup containing 19.2 per cent. non-volatile matter, 8.9 per cent. alcohol, anise, and a vegetable cathartic drug. The Government, therefore, charged that the medicine did not contain ingredients or medicinal agents effective for the relief and cure of the diseases which it was claimed to cure. The court imposed a fine of $75.

A plea of guilty was entered by H. A. Ingham & Co. of Vergennes, Vt., to the charge that statements and claims as to curative powers of a product called "Dr. H. A. Ingham's Vegetable Expectorant Nervine Pain Extractor" were false and fraudulent. An analysis of a sample of the product by the Bureau of Chemistry showed the same to contain alcohol, 86 per cent.; opium alkaloids, camphor, capsicum, and vegetable extractive matter. The Government, therefore, alleged that the medicine did not contain ingredients or medicinal agents effective, as the labels or circulars asserted, to subdue raging fever, or to cure typhoid fever, lung fever, scarlet fever, rheumatic fever, cholera, dysentery, sunstroke, diphtheria, bleeding at the lungs, nervous exhaustion, or piles, or to prevent fits of apoplexy and epilepsy when coming on, or to heal without inflammation or suffering all wounds, sprains, or burns, or to break up a felon, or to cure congestion of the lungs, pleurisy, fits of apoplexy, chronic rheumatism, paralyzed limbs, and croup.

It was also alleged by the Government that the statements, "For teething and restless children, it is not only safe and harmless, but positively beneficial; it agrees with the most tender child or feeble infant," were false and misleading in that they were of such nature as to mislead the purchasers into the belief that the article contained no harmful or poisonous ingredient, whereas, in fact, it did contain morphine and other opium alkaloids of a poisonous and deleterious nature, such as might prove harmful and deleterious to the health of tender children and feeble infants, and other persons, if consumed by them. The court fined the defendant $100.

Four thousand and ninety-two bottles of "Father John's Medicine" were seized in Philadelphia, Pa., it being alleged in the libel that the labels on the bottles and on the pasteboard packages containing the bottles bore statements regarding the curative effects of the medicine that were false and fraudulent. Claims were made by the manufacturers for the efficacy of the medicine in the treatment of consumption, coughs, colds, croup, asthma, bronchitis, sore throat,

whooping-cough, pneumonia, catarrh, rickets, and a number of other ailments. A judgment of condemnation and forfeiture was entered, and it was ordered by the court that the product be delivered to Carleton and Hovey Company, Lowell, Mass., upon payment of all the costs in the proceedings and the execution of a bond in the sum of $5000, to insure that the goods would not be sold unless truthfully relabelled.

A verdict of " guilty " was rendered against the American Laboratories, a corporation located at Philadelphia, Pa., for shipping into interstate commerce a product called " Bad-Em-Salz," which it was alleged was falsely and fraudulently labelled. An analysis of a sample of the product showed that it consisted of common salt, Glauber salt, baking soda, and a small amount of tartaric acid. It was claimed by the manufacturers that this preparation reproduced the medicinal properties of the great European springs famous for centuries for the cure of diseases of the stomach, intestines, liver, kidneys, or bladder, and that it represented the medicinal agents obtained by the evaporating of the water from famous European springs. The Government alleged, among other things, that these claims were false and misleading. It was also alleged that the statements in the circular indicating that the preparation contained ingredients or medicinal agents effective for dissolving gall-stones, for the prevention of gastritis, for curing diabetes, for preventing or checking chronic inflammation of the kidneys, and for relieving catarrh of the bladder, were false and fraudulent. A fine of $100 was imposed by the court.

Long List of Other Misbranded Medicines.

The following list includes other preparations against which the Government's charge that they were falsely or fraudulently labelled was sustained by the Federal courts. Statements were made on the labels of, or on the circulars accompanying, the preparations intended to make the purchaser believe that the medicines were effective cures for a great variety of diseases for which they were recommended by the manufacturers or promoters. The main allegations of the Government were upheld by the courts and judgment accordingly entered in connection with each of the following preparations: Radam's Microbe Killer, Hilton's Specific, Smith's Agricultural Liniment, Dr. Sullivan's Sure Solvent, Russell's White Drops, Stramoline, Wild Cherry Pepsin, Moreau's Wine of Anise,

Dr. Herman Koch's Brand Phosphate, Celery and Gin Compound, Swissco Hair and Scalp Remedy, Cod Liver Oil with Syrup of Tar, Dr. Mozley's Lemon Elixir, Sa-Yo Mint Jujubes, Gray's Glycerine Tonic Compound, Dr. Martel's Female Pills, Quickstep, Fryė's Remedy, Seawright's Magnesian Lithia Water, Hill's Aromatic Extract Cod Liver Oil (Hollander-Koshland Co.), Black's Pulmonic Syrup, Tetterine, Laxative Quinine Tablets, Mrs. Joe Person's Remedy, Maignen Antiseptic Powder, Cranitonic Scalp Food-Hair Food, Dr. David Kennedy's Cal-Cura Solvent, Schenck's Pulmonic Syrup, Keller's Flaxseedine, Tutt's Pills, Universal Rheumatic Remedy, Green Mountain Oil, Weber's Genuine Alpine Herb Tea, Montague's Liniment, Coe's Cough Balsam, White Stone Lithia Water, Kalamazoo Celery and Sarsaparilla Compound, Quality Damiana Compound, Dennis Eucalyptus Ointment, Cassidy's 4X, The Great Blood Purifier, Porter's Antiseptic Healing Oil, Ballard's Horehound Syrup Comp., Dr. Shoop's Night Cure, Dr. Shoop's Cough Remedy, Dr. Shoop's Restorative, Rheumacide, Rice's Mothers' Joy Salve, Milam, Old Jim Fields' Phosphate Dill and Gin, Stuart's Buchu and Juniper Compound, Ozomulsion, Jones' Break Up, Carswell's Liver Aid, Dr. Shoop's Twenty-Minute Croup Remedy, Rogers' Consumption Cure and Cough Lozenges, and Rogers' Inhalant.

"Kidney Cures" Seized.

Action against several so-called "kidney cures" has recently been taken under the Food and Drugs Act by the United States Department of Agriculture. In one case the shippers of a preparation labelled as "A Sure Cure for Bladder and Kidney Trouble" were prosecuted on the charge of falsely and fraudulently misbranding the product. They pleaded guilty and were fined $25 and costs by the court. This particular kidney "cure" was found to contain over 41 per cent. of alcohol. It was labelled "Old Jim Fields' Phosphate Dill and Gin—Mankind's Greatest Friend—A Sure Cure for Bladder and Kidney Trouble. It is also a Great Aid in Case of Urinary Trouble. Allenberg & Meister, Sole Agents, Memphis, Tenn." An analysis of the product showed that it contained no material amount of either dill or phosphate.

In another case 48 bottles of "Stuart's Buchu and Juniper Compound," prepared by the Stuart Manufacturing Company, Atlanta, Ga., were seized. The court issued a decree of condemnation, for-

feiture, and destruction on the ground that the claims upon the label were misleading, false, and fraudulent. On this label the manufacturers recommended their product as a remedy for a great variety of kidney and bladder diseases, and stated that the medicine contained 16 per cent. of alcohol.

According to the medical experts of the department, alcohol is a kidney irritant and is dangerous in many cases of kidney disease. For this reason many physicians advise their patients who suffer from any kind of kidney or bladder trouble to abstain from the use of alcohol, even in moderate quantities. Some manufacturers of kidney medicines which contain considerable quantities of alcohol also advise their customers to abstain from all alcoholic drinks, showing in this way that they know the harmfulness of alcohol in kidney diseases, even though they use it in their own preparations. It is the opinion of the medical experts of the department that such so-called "kidney remedies" as those recently seized are not only worthless but actually harmful, because of the amount of alcohol which they contain.

THE CULTIVATION OF MEDICINAL PLANTS.

Peppermint and Spearmint as Commercial Crops.

The annual production of peppermint and spearmint oil in the United States is estimated by the Department of Agriculture at about 250,000 pounds out of a total production throughout the world of about 600,000 pounds. Practically all of this oil is produced in Michigan, Indiana, and New York, a little less than 25,000 acres being planted to mint in these States. It is said, however, that there are other localities in which the industry could be profitably developed if there were a greater commercial demand for the oil. At the present time, however, the price of peppermint and spearmint fluctuates widely, and the entire industry would be likely to suffer from overproduction if the acreage were to be rapidly extended.

On the muck lands of southern Michigan and northern Indiana, where mint culture has become highly specialized, the cost of establishing an acre of new mint and caring for it during the first season is placed at about $30. In subsequent years the cost per acre would be about $15. These estimates do not make any allowance for fertilizers, taxes, interest on the land, equipment, superintendence, and

other overhead charges of this character. In Wayne County, New York, where mint is cultivated on uplands, the cost of preparing the land is somewhat less, but the tillage costs, on the other hand, are higher because of the greater quantity of hand labor required. The industry in the New York district, however, appears to be declining in extent. It is now carried on in rather a small way, chiefly by coöperation between land owners and practical mint growers. In Michigan and Indiana, on the other hand, many of the growers have invested considerable capital in the business and have provided themselves with an equipment which enables them to handle the product in an economical manner.

The yield of oil per acre varies widely, ranging from almost nothing to nearly 100 pounds. About 325 pounds of peppermint and 340 pounds of spearmint are required to produce a pound of oil in commercial practice. The price varies as widely as the yield. For peppermint oil in tins, however, the average trade price for the last forty years has been in the neighborhood of $2.50 a pound, although it has sometimes fallen as low as 75 cents. Spearmint oil, which used to be a little cheaper than peppermint, has averaged for the past five years $3.55 a pound. These prices, however, it must be remembered, are somewhat higher than those which the producer would receive.

In Michigan and Indiana the large plantations have of late years installed their own distilling plants, many of which are elaborate and expensive. For growers who do not have their own distilling plants, the customary charge for distilling oil has been fixed for many years at 25 cents a pound. The bulk of the mint grown in this country is distilled in comparatively small plants which serve the needs of several growers.

Both peppermint and spearmint thrive best in deep soils which are rich in humus and retentive of moisture but fairly open in texture and well drained. They may also be grown successfully in well-prepared upland soils, such as those suitable for corn or potatoes. The area selected should be summer fallowed for one or two years before the mint is set out, or else it should be cropped with some plant that requires clean and frequent tillage. The tillage is also continued as long as possible during the growth of the crop, for successful mint growing implies clean culture at all stages of progress. The crop is cut at the time of full bloom, which, with new plantings, is usually early in September. It is, as a rule, allowed to

dry partially in the field before being hauled to the still. Laboratory experiments show that this results in an appreciable loss of oil, but the loss is not regarded by growers as sufficient to offset the increased cost of handling and distilling the green herb. Exposure to frost, however, must be avoided, as frozen mint yields scarcely one-half of the quantity of oil which could otherwise be secured.

Nitrate of soda, applied at the rate of 50 to 150 pounds to the acre, and potash have been widely used as fertilizers to stimulate the growth of mint, and potash is particularly useful against a form of chlorosis, due, apparently, to too much water in the soil. On the other hand, ground bone, acid phosphate, and lime do not seem to be of marked benefit. Few diseases and pests trouble peppermint, and spearmint is practically free from them all. During very wet seasons a rust fungus sometimes appears, and crickets, grasshoppers, and caterpillars may always do some damage. On suitable soil and with proper cultivation, yields of from two to three tons of mint herb per acre may be expected. As has already been said, however, the yield of oil is extremely variable, and large yields can be expected only from fields that are in the best possible condition. A fair average for well-managed commercial plantings may be said to be 30 pounds of oil per acre. Since the oil is the chief marketable product, adequate distilling facilities and a market for the oil are essential to success in the industry, and the prospective mint grower should assure himself on these points before investing capital in plantations.

PROGRESS IN APPLIED SCIENCE.

Oysters vs. Smelters.

An interesting case was fought out in the United States District Court at Norfolk, Va., and a decision given by the jury on Saturday, June 27, 1914. Mr. Hemingway, a wealthy oyster packer who is retiring from the oyster business, brought suit for $15,000 damage to his oyster beds by the Virginia Smelting Company

Plaintiff produced receipts from the State inspector of grounds leasing him oyster ground near the smelting plant, and showed that the smelting company poured slag on some of his beds. The grounds for the suit were based on damage to oysters by the action of " copper and other deleterious substances " on the oysters.

Plaintiff produced an abundance of evidence from oystermen and others who swore that the smeltery had ruined the oysters for distances as much as fifty miles in all directions. A pamphlet from the State Bureau of Chemistry was put in evidence in support of the view that the smeltery did the damage. A chemist employed in government service was placed upon the stand and testified to the finding of certain percentages of copper in oysters from near the works, and gave his explanation of how the copper came to them from the plant, although he found only " traces " of copper in the slag.

The defence proved that copper in slag was not soluble; that its business is to recover copper and not to scatter it over the country; that enormous amounts of Paris green were spread on the lands in the surrounding districts yearly for a long time; that there were many other sources of copper, and, finally, that *copper is as necessary to the life of the oyster as iron is necessary as a carrier of oxygen in mammals.*

It proved that oysters in Spain, Holland, England, New York, New Jersey, and many other places had copper in quantities greater than was claimed by plaintiff in the oysters near the smeltery. The defence showed that oysters all over the district, as much as fifty miles away and up the river, had more copper than near the smelting plant. The prosecuting attorney claimed that the defendant was proving *that the plant was taking the copper out of the oysters as they got nearer the works.* The defendant solemnly repudiated any such claim, but proved that all the damage was due to sewage, and showed by incontrovertible evidence the oysters from these beds were not allowed to be sold for food and that copper had nothing to do with it, but that it was purely a question of sewage contamination.

During the proceedings both sides got busy opening oysters to prove their respective contentions. The results were often very amusing. The jury awarded the plaintiff $250, which was, of course, a practical victory for the smelting company. (From *Engineering and Mining Journal,* 1914.)

Treating Phosphate Rock.

Classified lists of the processes already devised for the manufacture of phosphatic fertilizers, and brief discussions of some of these processes, are given in a new professional paper of the United States Department of Agriculture, Bulletin No. 312. These lists have been prepared because it is believed that a better acquaintance

with what has already been done in this line would save the useless repetition of much work.

At the present time by far the greater part of the phosphate fertilizer is derived from phosphorite or amorphous phosphate rock, of which there are enormous deposits in the United States. The location and character of these deposits are also discussed in the bulletin already named. Their value depends primarily on the grade of the rock, but its accessibility and the distance to market are also factors of great economic importance.

The various methods for treating the phosphate rock are divided in the bulletin into ten classes as follow:

(1) Acid treatment, which includes the manufacture of superphosphate and phosphoric acid; (2) combined heating and acid treatment; (3) double decomposition by means of a silicate or an alkali; (4) processes used in connection with the steel industry; (5) processes in which the phosphorus or phosphoric acid is volatilized; (6) treatment dealing with the production of two or more fertilizer elements; (7) electrolysis; (8) enrichment or concentration of phosphates; (9) processes and apparatus for the mechanical treatment of phosphates; (10) miscellaneous processes.

In the appendix are tables giving in chronological order the patents granted for various methods for treating phosphate rock, together with a brief description of the various principles employed and the object of the process.

A SPECIAL LECTURE AT THE PHILADELPHIA COLLEGE OF PHARMACY.

Europe in War Times.

Professor Charles E. Vanderkleed left America on February the second, on the *Ryndam* of the Holland-America Line, in the interest of the H. K. Mulford Company, of which firm he is the chief chemist, three days' notice being all that was given to him for preparation.

Considerable excitement was created on the steamer on the 8th of February, by the reception by " wireless " of the news that Germany had declared all the waters around England a war zone, to go into effect on the 18th. Fortunately all danger of being torpedoed was escaped by the vessel reaching Holland on the 15th.

He spoke of the care taken by the Holland-America Line of the lives of the passengers while crossing the North Sea. All the life-boats were uncovered, ready to be swung out, and the crews were stationed by them. The captain, pilot, and all the officers were on the bridge with rifles in their hands, so that if a floating mine was sighted in a position difficult for the steamer to avoid it might be exploded by a rifle bullet.

He said that his trip abroad was for purely commercial purposes, and he had not the opportunity to investigate things deeply. As an American of Dutch descent he was thoroughly neutral, as was also the Dutch nation, although it had a serious problem to contend with. He specially admired Dutch diplomacy: the men in charge of the Foreign Office had handled their difficult problems well; they have succeeded in remaining on friendly terms with Germany as also with England; anything less would have caused the wiping out of Holland.

At Frankfürt the principal object of interest was the Ehrlich Institute, where he had the honor of meeting Professor Paul Ehrlich (of salvarsan fame), who has since died. Professor Vanderkleed spoke of the great reverence shown him by the students and said that if students in America would show the same reverence for their professors as was shown at the Ehrlich Institute, then teaching would be an ideal thing.

At Berlin he attended a meeting of the German Pharmaceutical Association, on invitation of Professor Thoms, who was to deliver that evening an address on the "Newer Remedies" of 1914. The meeting was considerably different from that of a meeting of the Philadelphia Branch of the American Pharmaceutical Association. It was formal, oppressively formal. At the close of the meeting a gentleman got up and offered the customary resolutions of thanks and the meeting adjourned. The men who attended were all older men. The next day he went out to Dahlen, a suburb of Berlin, and was taken all over the Pharmaceutical School of the University of Berlin. It was a beautiful institution, beautifully equipped, but perhaps not better than our institutions here for teaching pharmacy.

Professor Vanderkleed then made a trip to Denmark and Sweden. If it was hard to get out of Germany into Holland, it was decidedly harder to get into Denmark. The examination given him was a kind of third degree.

When he returned to Berlin he saw many evidences of the war: he saw the hospitals, the wounded soldiers, regiments marching to the front, pathetic sights. When a regiment starts for the front their friends decorate them with flowers, even in early spring time. There is little noise. War with them has settled down to business; the band generally plays a Sousa march or something resembling it.

On the way home he passed through Switzerland, where everything is at a standstill, as they get no supplies from outside the country. The Swiss, however, seem care-free and happy; there was no danger of their getting into the war, as none of the warring nations want the job of going over the Alps. In Berne he had a delightful interview with Professor Tschirch, who desired to be remembered to "*Mein Freund*," Professor Remington.

Passing through Italy on his way home, he found the people in the throes of the excitement of going to war. War had not been declared, but the excitable Italian nature was crying to get into the war; there was nothing to do but to let them fight.

As his first view of the war zone was English, his last view was of England's Gibraltar, solid as a rock. He could not but think of what Gibraltar stands for—the principles upon which the English Government and ours are builded.

In concluding, he said: "What about America in this war? Several things are needed over here in order to take advantage of the situation—not to take advantage in an unfair way, but it is the duty of America to step in and fill her place. There is an opening here for various lines of industry, including pharmacy and chemistry, to take advantage of this situation in a proper manner.

"The American Government must come to the aid of our manufacturers and enable us to get on a sound foundation. We must have revision of our patent laws in such a way that we will not grant patents to foreigners unless the products are manufactured in this country, and thus prevent the condition of want that is staring Americans in the face to-day. Then, too, we must have the coöperation between those big industries whereby all the various products can be utilized."

He concluded his address by picturing the most beautiful sight that he saw on his whole trip. He said: "I arrived in America on the 16th of May, late at night; the steamer anchored over night, and early next morning was ready to go up the harbor to New York.

Getting up early and going out on deck, I heard the boom of the sunrise gun, and, looking out over the water, I saw the Stars and Stripes fluttering to the top of the flagpole at Fort Wadsworth. I stood at attention and I saluted the flag, and I said, 'The hope of the world.'"

C. B. Lowe.

OBITUARIES.

Charles E. Bessey.

Charles Edwin Bessey, an honorary member of the Philadelphia College of Pharmacy and one of the most distinguished botanists of America, was born May 21, 1845, in Milton Township, Wayne County, Ohio. His father, Adnah Bessey, and his mother, Margaret Ellenberger, migrated from western Pennsylvania about ten years earlier and were married about 1841. The father received a college training for two years, but this was not completed, owing to the removal to Ohio just alluded to. Both father and mother were of German and French descent, with the Germanic predominating. The name Bessey is French in its original form, de Bessé, belonging to a family of French Huguenots living in Alsace and who fled to England toward the end of the seventeenth or beginning of the eighteenth century on account of religious persecution.

Adnah Bessey's father was a weaver, and, though Adnah himself was a farmer, he was a skilled surveyor as well, and as such was in demand through the vicinity. He was much interested in science, and early inspired a love of it in his oldest son, who thus received, in addition to the country-school education, an inclination towards science which eventually determined his career. After finishing the country school, the subject of this sketch entered the academy and completed the course there, spending part of one or two years in school teaching to help earn his way. The death of his father in 1863 left him responsible for the care of the farm and the younger members of the family, as well as his mother. In the fall of 1865 he accepted employment with a surveyor and spent nearly a year assisting him in surveying forest lands in the then limits of civilization in north central Michigan. In the course of this work, which involved surveying, estimating timber, etc., he made many observations which were of value in his later life. Work becoming slack, he decided to study further to better fit himself for civil engineering work, and so, on the advice of his employer, entered the Michigan Agri-

cultural College of the middle of the freshman year in the summer of 1866. Much to his disappointment, he was not allowed to select a special course in engineering subjects, but was compelled to take the regular course required of all. It was not long, however, before the love of botany which had always been present manifested itself, and some time before he graduated in November, 1869, he had determined to devote himself to this science. His winter vacations he spent as a school teacher, thus earning the money by which he paid his way through college.

Shortly after graduating, while acting as an assistant in the Horticultural Department, he was offered the professorship of botany and horticulture at the Iowa State Agricultural College at Ames, where he assumed the duties in February, 1870. In the meantime, however, the president had selected Professor J. L. Budd as professor of horticulture, so, on assuming his position, he was required to teach botany and zoology, including entomology, instead of botany and horticulture, for which he was employed. Although he did good work in these other subjects, giving the first training to such men as Hornaday, of the New York Zoological Gardens and Osborn, of the Ohio State University, yet botany was his special love.

He early saw the futility of teaching the subject without laboratory work, and he was one of the first in the country to require laboratory work in the subject, beginning this with the use of the compound microscope in the year 1872 or 1873.

In 1880 he published a text-book in botany, based largely on the results of the German investigations and putting in print in the English language, for the first time, a text-book in which laboratory work was required and in which the study of lower plants and the structure and physiology of plants were made a large part of the course. This was followed, in 1884, by a shorter edition of the book, "The Essentials of Botany," of which seven editions appeared, the eighth edition in collaboration with his son, Ernst A. Bessey, having appeared in the fall of 1914.

While in Iowa he identified himself with the educational improvements, as well as the agricultural and horticultural societies, and was probably the prime mover in founding the Iowa Academy of Science.

Under his investigations the flora of Iowa began to be well known, not merely the higher plants, but also the lower plants, while studies were made of the natural forage plants of the State.

In the fall of 1884 he accepted the position of Professor of Botany and Dean of the Industrial College of the University of Nebraska, remaining there until his death, February 25, 1915. Three times he was made acting chancellor, and would have been made chancellor of the University except for the fact that he preferred the botanical work with less salary to the administrative work as chancellor.

As upon going to Iowa, when he went to Nebraska, he associated himself at once with the horticultural and agricultural societies, and also helped establish the Nebraska Academy of Sciences, of which he was president several times.

In Nebraska he gave great attention to forage plants and to the question of reforestation, being largely responsible for the setting aside of a forest reservation, which, unlike others, is one where trees are to be planted.

In the Department of Agriculture, and in various colleges and universities throughout the country, there are many who were formerly his students, both in Iowa and Nebraska. It is through these that his influence is spread, perhaps more than through his own investigations, for, though he was a skilled investigator, he could never bring himself to neglect his students for the advantage of his investigations, and any student who needed help would be permitted at almost any time to disturb his own work. His life may be summed up in what were almost his last words a day or two before his death, that "He pitied the teacher who used his position for his own self-advancement instead of giving all his energy to the helping of the students whom he was supposed to teach"; and again, "The whole philosophy of life is summarized in this one word, love."

Professor Bessey was married on December 25, 1873, to Miss Lucy Athearn, of West Tisbury, Mass. There were three sons, of whom the oldest, Edward, was assistant professor in charge of the electrical engineering course at Colorado Agricultural College at the time of his death in 1910. The next son, Ernst, has been since 1910, professor of botany at the Michigan Agricultural College, his father's Alma Mater, and the third, Carl, is an electrical engineer in Chicago.

Jacobus Polak.

Jacobus Polak, a corresponding member of the Philadelphia College of Pharmacy and a renowned pharmacist and chemist of Amsterdam, Holland, died on May 25, 1915, at the age of seventy-

five. He became a pharmacist at the age of twenty, and soon evinced a great interest in the educational and professional side of his calling. For many years he was chairman and member of the Board of Directors of the Nederlandsche Maatschappij ter bevordering der Pharmacie. As showing the nature and extent of his services upon his retirement from active work, the members elected him an honorary member. His efforts were, however, not confined to the drug business alone, as he was for some twenty years a member of the Municipal Board of Amsterdam. For fifty years, he was the member of the committee to pass on licentiates in both medicine and pharmacy. Dr. Polak was a man of great nobility of character, broad sympathies, and a public servant. He published a great many scientific articles, and prepared a number of addresses of lasting value. His influence on pharmacy extended beyond the Netherlands, and his name and fame are international. At the time of the celebration, in 1910, of his fifty years' jubilee as pharmacist, he retired from public life, and devoted his closing years quietly among his books and his friends.

Charles G. Dodson.

Dr. Dodson graduated from the Philadelphia College of Pharmacy in 1859. A native of Bristol, he came to Philadelphia early in life and took up the study of pharmacy. Shortly after his graduation he started in business, and for many years was associated with Frederick Brown, '61, in the wholesale and retail drug business at Fifth and Chestnut Streets. About twenty-five years ago the business was moved to 127 South Fourth Street, and a few years afterward Dr. Dodson acquired the Brown interests.

Charles L. Eberle.

Mr. Eberle was a pioneer Germantown druggist, and one of the foremost residents of this portion of the city. At the time of his death he was seventy-seven years of age. Mr. Eberle had been identified with the schools and various civic enterprises for over half a century. He was born in Germantown, but was early apprenticed in the drug business in Lancaster, Pa. He later came to Philadelphia and was graduated from the Philadelphia College with the class of 1859. Mr. Eberle purchased a drug store from Abram Rex at Germantown Avenue and Church Lane in 1859. It was the only drug

store in Germantown at that time. Mr. Eberle continued as the proprietor of this store for forty years, retiring in 1899. During his earlier years he was active in College and Alumni Association work, serving on the Board of Trustees of the College, and in various official capacities in the Alumni Association, holding the office of president for a number of years. He also contributed to pharmaceutical publications, and a few years ago he prepared a summarized history of Germantown.

William H. Lacey.

William H. Lacey, aged sixty-four years, for many years a member of the College and for many years a practising pharmacist at Nineteenth and Green Streets, Philadelphia, Pa. Mr. Lacey became the manager of this store in 1873 and the owner in 1880. The secretary of the College, Dr. C. A. Weidemann, paid an unusually high tribute to his memory in saying that " Mr. Lacey was highly esteemed in his neighborhood, and conducted his store very successfully and honorably."

George Jones Scattergood.

Mr. Scattergood was a Philadelphian, receiving his education at the Friends' Select School. Later he attended the Westtown Boarding School. In 1852 he became an apprentice of Charles Ellis & Co., on Chestnut Street above Second. In the autumn of 1854 he matriculated at the Philadelphia College of Pharmacy, and was graduated with highest average in his class in 1856, and became a member of the College in 1859. Soon after his graduation he became a successful retail druggist at the northwest corner of Fifth and Callowhill Streets. In 1860 he was admitted into the firm of Carter & Scattergood, manufacturing chemists, at twenty-fourth and Bainbridge Streets, where he continued until 1890. Having accumulated an estate sufficient to satisfy his moderate desires, he retired from active business and devoted his time and talents to the promotion of various charitable, educational, and religious works.

George J. Scattergood was noted from quite early life for strict integrity and sincere loyalty to the doctrines and testimonies of the Society of Friends, of which he was a member. His fellow-members loved and appreciated him highly, bestowing upon him many important offices and appointments, the duties of which he performed with fidelity and marked ability.